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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/729,208	12/05/2003	Marina E. Kondakova	87230AEK	9481

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EXAMINER

SANDVIK, BENJAMIN P

ART UNIT	PAPER NUMBER
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2826

DATE MAILED: 06/30/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/729,208

Applicant(s)

KONDAKOVA ET AL.

Examiner

Ben P. Sandvik

Art Unit

2826

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-48 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-48 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)               | Paper No(s)/Mail Date. ____   |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date ____   | 6) <input type="checkbox"/> Other: ____                                     |

### DETAILED ACTION

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-7, 38, 45-48 are rejected under 35 U.S.C. 102(b) as being anticipated by Thompson et al (U.S. PG Pub #20020034656).

With respect to **claims 1 and 2**, Thompson teaches a cathode and an anode (Paragraph 25), and located there between, a light emitting layer (LEL) comprising a phosphorescent green light emitting material (Paragraph 46) and a host material for the light emitting material (Paragraph 26), and in a layer adjacent to the LEL on the anode side, an exciton blocking layer containing a compound having a hole mobility of at least  $5 \times 10^{-3} \text{ cm}^2 \text{ V}^{-1} \text{ s}^{-1}$  and a triplet energy exceeding that of the green light emitting material of the LEL (Paragraphs 25 and 30).

With respect to **claim 3**, Thompson teaches that the phosphorescent green light emitting material is an organometallic compound comprising a 5<sup>th</sup> row periodic table transition metal (Paragraph 47).

With respect to **claim 4**, Thompson teaches a metal that is platinum (Paragraph 47).

With respect to **claim 5**, Thompson teaches that the organometallic compound includes a ligand that can be coordinated to a metal through an  $sp^2$  carbon and a heteroatom (Paragraph 52).

With respect to **claim 6**, Thompson teaches a ligand that is a phenylpyridine group (Paragraph 23).

With respect to **claim 7**, Thompson teaches bis(2-phenylpyridinato-N,  $C^2$ ) (Paragraph 47).

With respect to **claim 38**, Thompson teaches a hole transporting layer adjacent to the exciton-blocking layer on the anode side (Paragraph 25) comprising 4,4'-Bis[N-(1-naphthyl)-N-phenyl-amino]biphenyl (Paragraph 29).

With respect to **claim 45**, Thompson teaches a display (Paragraph 51).

With respect to **claim 46**, Thompson teaches an area lighting device (Paragraph 51).

With respect to **claim 47**, Thompson teaches the host in the LEL layer comprises CBP (Paragraph 56).

With respect to **claim 48**, Thompson teaches a process for emitting light comprising applying a potential across the device (Paragraph 23).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 8-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thompson, in view of Matsuura et al (U.S. PG Pub #20030137239).

With respect to **claims 8, 9, and 12**, Thompson teaches all of the limitations of claim 1, but does not teach a compound in the exciton-blocking layer that is a triarylamine, or that the compound includes two or more distinct triarylamine groups and wherein no multiple-ring or fused-ring systems are attached simultaneously to the nitrogen atoms of the two or more triarylamine groups. Matsuura teaches a compound in an exciton-blocking layer that is 1,1-Bis(4-(N,N-di-p-tolyamino)phenyl)cyclohexane (Paragraph 86), which meets the limitations of claims 8 and 9. It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the exciton-blocking layer of Thompson to contain a triarylamine compound as taught by Matsuura in order to improve the emission luminance and emission lifetime over the prior art.

With respect to **claims 10 and 11**, Thompson teaches all of the limitations of claim 1, but does not teach the exciton-blocking layer represented by formula (2), or wherein R1 and R2 independently represent hydrogen or an independently selected hydrocarbon substitute provided that R1 and R2 can join to form a hydrocarbon ring, and each Ra represents an independently selected hydrocarbon substitute. Matsuura teaches an exciton-blocking layer that is 1,1-Bis(4-(N,N-di-p-tolyamino)phenyl)cyclohexane (Paragraph 86), which meets the limitations of claims 10 and 11 according to the specification in this application. It

would have been obvious to one of ordinary skill in the art at the time the invention was made to make the exciton-blocking layer of Thompson with the material taught by Matsuura in order to improve the emission luminance and emission lifetime over the prior art.

Claims 13-18, 25-30, 39, and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thompson, in view of Adachi (U.S. Patent #6867538).

With respect to **claims 13-18 and 39**, Thompson teaches a cathode and an anode (Paragraph 25), and located there between, a light emitting layer (LEL) comprising a phosphorescent green light emitting material (Paragraph 46) and a host material for the light emitting material (Paragraph 26), and in a layer adjacent to the LEL on the anode side, an exciton blocking layer containing a compound having a hole mobility of at least  $1 \times 10^{-3} \text{ cm}^2 \text{ V}^{-1} \text{ s}^{-1}$  and a triplet energy exceeding that of the green light emitting material of the LEL (Paragraphs 25 and 30);

that the phosphorescent green light emitting material is an organometallic compound comprising a 5<sup>th</sup> row periodic table transition metal (Paragraph 47);

a transition metal that is platinum (Paragraph 47);

that the organometallic compound includes a ligand that can be coordinated to a metal through an  $sp^2$  carbon and a heteroatom (Paragraph 52);

a ligand that is a phenylpyridine group containing compound (Paragraph 23);

that the organometallic compound is chosen to be bis(2-phenylpyridinato-N,  $C^2$ ) (Paragraph 47);

a hole transporting layer adjacent to the exciton-blocking layer on the anode side (Paragraph 25) comprising 4,4'-Bis[N-(1-naphthyl)-N-phenyl-amino]biphenyl (Paragraph 29). (CIm 39)

Thompson does not teach that the electroluminescent device comprises a hole-injecting layer. Adachi teaches a phosphorescent organic light-emitting device that comprises a hole-injecting layer (Col 4 Ln 21-22). It would have been obvious to one of ordinary skill in the art at the time the invention was made to add a hole-injecting layer into the device of Thompson as taught by Adachi in order to efficiently inject holes from the anode.

With respect to **claims 25-30**, Thompson teaches a cathode and an anode (Paragraph 25), and located there between, a light emitting layer (LEL) comprising a phosphorescent green light emitting material (Paragraph 46) and a host material for the light emitting material (Paragraph 26), and in a layer

adjacent to the LEL on the anode side, an exciton blocking layer containing a compound having a hole mobility of at least  $1 \times 10^{-3} \text{ cm}^2 \text{ V}^{-1} \text{ s}^{-1}$  and a triplet energy exceeding that of the green light emitting material of the LEL (Paragraphs 25 and 30);

that the phosphorescent green light emitting material is an organometallic compound comprising a 5<sup>th</sup> row periodic table transition metal (Paragraph 47);

a transition metal that is platinum (Paragraph 47);

that the organometallic compound includes a ligand that can be coordinated to a metal through an  $\text{sp}^2$  carbon and a heteroatom (Paragraph 52);

a ligand that is a phenylpyridine group containing compound (Paragraph 23);

that the organometallic compound is chosen to be bis(2-phenylpyridinato-N,  $\text{C}^2$ ) (Paragraph 47);

a hole transporting layer adjacent to the exciton-blocking layer on the anode side (Paragraph 25) comprising 4,4'-Bis[N-(1-naphthyl)-N-phenyl-amino]biphenyl (Paragraph 29). (CIm 40)

Thompson does not teach that the electroluminescent device comprises a hole-blocking layer on the cathode side of the LEL. Adachi teaches a phosphorescent organic light-emitting device that comprises a hole-blocking layer on the cathode side of the LEL (Col 6 Ln 52-53). It



would have been obvious to one of ordinary skill in the art at the time the invention was made to add a hole-blocking layer into the device of Thompson as taught by Adachi in order to substantially block the diffusion of holes and enhance device efficiency.

Claims 19-23 and 31-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thompson and Adachi, in view of Matsuura.

With respect to **claims 19, 20, 23, and 31, 32, 35** Thompson and Adachi teach all of the limitations of claims 13 and 25, respectively, but do not teach a compound in the exciton-blocking layer that is a triarylamine, or that the compound includes two or more distinct triarylamine groups and wherein no multiple-ring or fused-ring systems are attached simultaneously to the nitrogen atoms of the two or more triarylamine groups. Matsuura teaches a compound in an exciton-blocking layer that is 1,1-Bis(4-(N,N-di-p-tolyamino)phenyl)cyclohexane, which meets the limitations of claims 8 and 9. It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the exciton-blocking layer of Thompson and Adachi to contain a triarylamine compound as taught by Matsuura in order to improve the emission luminance and emission lifetime over the prior art.

With respect to **claims 21, 22 and 33, 34**, Thompson teaches all of the limitations of claims 13 and 25, respectively, but does not teach the exciton-blocking layer represented by formula (2), or wherein R1 and R2 independently

represent hydrogen or an independently selected hydrocarbon substitute provided that R1 and R2 can join to form a hydrocarbon ring, and each Ra represents an independently selected hydrocarbon substitute. Matsuura teaches an exciton-blocking layer that is 1,1-Bis(4-(N,N-di-p-tolyamino)phenyl)cyclohexane (Paragraph 86), which meets the limitations of claims 10 and 11 according to the specification in this application. It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the exciton-blocking layer of Thompson with the material taught by Matsuura in order to improve the emission luminance and emission lifetime over the prior art.

Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Thompson and Adachi, in view of Hung et al (U.S. Patent #6208075).

With respect to **claim 24**, Thompson and Adachi teach all of the limitations of claim 13, but do not teach that the hole-injecting layer comprises a plasma-deposited fluorocarbon polymer. Hung teaches a hole-injecting layer comprising a plasma-deposited fluorocarbon polymer (Col 2 Ln 35-58). It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the hole-injecting layer of Thompson and Adachi with a plasma-deposited fluorocarbon polymer in order to enhance hole injection.

Claims 36 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thompson and Adachi, in view of Thompson et al (U.S. PG Pub #20030068528), hereafter known as Thompson(2).

With respect to claims 36 and 37, Thompson and Adachi teach all of the limitations of claim 25, but do not teach an aluminum complex of BAQ that emits blue light when it luminesces. Thompson(2) teaches a hole-blocking layer comprising BAQ (Paragraph 10) that emits blue light (Paragraph 111) when it luminesces. It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the hole-blocking layer of Thompson and Adachi with BAQ in order to create a multicolor device.

Claims 41-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thompson, in view of Littman et al (U.S. Patent #5405709).

With respect to **claims 41-44**, Thomson teaches all of the limitations of claim 1, but does not teach a means for emitting white light, including two or more compounds capable of emitting complimentary colors, a compound capable of emitting white, a filtering means. Littman teaches a means for emitting white light (Col 9 Ln 14), including two or more compounds capable of emitting complimentary colors (Col 5 Ln 16-23), a compound capable of emitting white light (Col Ln 26), and a filtering means (Col Ln 29-31). It would have been obvious to one of ordinary skill in the art at the time the invention was made to

provide the device of Thompson with a means for emitting white light as taught by Littman in order to create a multicolor image display.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ben P. Sandvik whose telephone number is (571) 272-8446. The examiner can normally be reached on Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on (571) 272-1915. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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